

Response to Office Action Mailed June 21, 2010

A. Claims in the Case

Claims 1-20 and 29-33 have been rejected. Claims 1 and 7-8 have been amended. Claims 1-20 and 29-33 are pending in the case.

B. The Claims Are Not Obvious in View of Moriceau et al. Pursuant To 35 U.S.C. § 103(a)

The Examiner has rejected claims 1-4, 6, 7, 11, 12, 14, 18, 20, 31, and 33 as being unpatentable over International Patent Publication No. WO 99/35674 to Moriceau et al. ("Moriceau"). Applicant notes that U.S. Patent No. 6,756,286 has been used as an English Language Equivalent for Moriceau. Applicant respectfully disagrees with this rejection.

In order to reject a claim as obvious, the Examiner has the burden of establishing a *prima facie* case of obviousness. *In re Warner et al.*, 379 F.2d 1011, 154 USPQ 173, 177-178 (CCPA 1967). To establish a *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ. 580 (CCPA 1974), MPEP § 2143.03. Moreover, in an obviousness determination, it is important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the manner claimed. *Takeda chemical v. Alphapharm*, 492 F.3d 1350, 1356-57 (Fed. Cir. June 28, 2007) (citing *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1731 (2007)).

Applicant respectfully submits that Moriceau at least fails to teach all of the features of Applicant's claims.

Claim 1

Applicant's claim 1 includes, but is not limited to, the features of:

depositing at least one intermediate layer on a substrate, wherein the substrate is formed from monocrystalline silicon and wherein the intermediate layer is formed from doped silica comprising extrinsic atoms, wherein the extrinsic are atoms of phosphorus or phosphorus and boron, thus forming an intermediate layer of phospho-silicate glass (P.S.G.) or boro-phospho-silicate glass (B.P.S.G.),

The Office Action appears to rely solely on the disclosure of Moriceau to teach the combined features of Applicant's claims. Applicant submits that Moriceau does not appear to teach or suggest all of Applicant's claimed features.

For example, Applicant's claims include, but are not limited to, the feature of "depositing at least one intermediate layer on a substrate, wherein the substrate is formed from monocrystalline silicon and wherein the intermediate layer is formed from doped silica comprising extrinsic atoms, wherein the extrinsic are atoms of phosphorus or phosphorus and boron, thus forming an intermediate layer of phospho-silicate glass (P.S.G.) or boro-phospho-silicate glass (B.P.S.G.). Applicant submits that Moriceau does not appear to teach or suggest forming a phosphorous doped layer on a monocrystalline substrate.

Claim 7

Applicant's claim 7 includes, but is not limited to, the feature of:

depositing at least one dielectric intermediate layer on a substrate formed from silicon, the dielectric intermediate layer comprising at least one base material wherein the base material is formed from silica and comprises extrinsic atoms, wherein the extrinsic atoms are atoms of phosphorus or phosphorus and boron,

thus forming an intermediate layer of phospho-silicate glass (P.S.G.) or boro-phospho-silicate glass (B.P.S.G.);

Therefore, for at least the reasons recited above, Applicant submits that Moriceau at least fails to implicitly or explicitly teach this feature, in combination with the other features of Applicant's claims.

C. The Claims Are Not Obvious Over Moriceau in view of Harberger Pursuant To 35 U.S.C. § 103(a)

The Examiner has rejected claims 5, 8-10, 15-17, 19, 29, 30, and 32 as being unpatentable over Moriceau in view of U.S. Patent No. 6,417,075 to Harberger et al. ("Harberger"). Applicant respectfully disagrees with this rejection.

Applicant's claim 1 includes at least some features from claim 8. For example, Applicant's claim 1 includes, but is not limited to, the feature of:

depositing at least one intermediate layer on a substrate, wherein the substrate is formed from monocrystalline silicon and wherein the intermediate layer is formed from doped silica comprising extrinsic atoms, wherein the extrinsic are atoms of phosphorus or phosphorus and boron, thus forming an intermediate layer of phospho-silicate glass (P.S.G.) or boro-phospho-silicate glass (B.P.S.G.),

With respect to the use of phosphorous doped silicon layers, the Office Action cites Harberger, stating:

As to claim 8, the examiner notes that applicant has only included boron when phosphorus is also present, meaning that the claim does not include BSG as a possible glass material for the intermediate layer. Moriceau does not appear to explicitly disclose the use of phosphorus as a dopant for the intermediate layer. However, Harberger teaches in a method for producing thin substrate layers: using

doped oxides such as PSG (phosphosilicate glass) or BPSG (borophosphosilicate glass) as the intermediate bonding layer in order to increase the etching rate in chip detachment (column 7 line 66 to column 8 line 3, claim 16). To create a doped PSG or BPSG, phosphorus atoms or a mix of boron and phosphorus atoms respectively must be used as a dopant for the intermediate layer. It would have been obvious to substitute phosphorus, or a mix of boron and phosphorus, as the dopants for the intermediate layer as taught by Habberger with the boron dopant of Moriceau as an improvement to increase rate of detachment.
(Office Action, pg. 8)

The Office Action appears to take the position that Habberger teaching of forming a dopant having phosphorous atoms can be applied to the doped layers described in Moriceau. Applicant disagrees. Habberger teaches:

The separation of the useful layer from the bulk layer is preferably carried out by wet chemical etching. In this step the etching agent (such as HF) is aspirated into the channels under the effect of capillary forces. The driving forces are the chemical reaction and the surface tension. The rate of flow or the throughput quantity, respectively, is described in approximation by the Hagen-Poiseuille law and depends on the channel lumen in the fourth power. In large-area chips or generally in the separation of large-area wafer zones the removal of the reaction products (e.g. SiF_4) may be assisted by ultrasound, centrifugal force, thermal gradients (generated, for instance, by means of IR laser radiation) etc.
(Habberger, Col. 4, lines 20-32)

Doped oxides, particularly the PSG, TEOS, PECVD, LPCVD, APCVD and BPSG oxides used in CMOS processes, may also be used instead of pure oxide as materials for the bonding layers. This provision is suitable to increase the etching rate in chip detachment.
(Habberger, Col. 7, line 65 – Col. 8, line 3)

Applicant notes that Habberger appears to teach a method of separating layers by wet etching. In order to “increase the etching rate in chip detachment”, Habberger teaches the use of BPSG oxides, among others. Applicant submits that Habberger teaches the use of phosphorous dopants to increase the rate of chemical etching. Habberger does not appear to teach or suggest the use of

heat treatment on a phosphorous doped layer, nor does Harberger appear to teach or suggest that use of a phosphorous doped layer would “produces micro-bubbles or micro-cavities which weaken the intermediate layer and render the intermediate layer plastically deformable.” Applicant further submits that there is no teaching or motivation that would suggest to one of ordinary skill in the art that forming a layer having phosphorous doping, as taught in Harberger, would be useful in the invention of Moriceau. In fact, the phosphorous doping would be expected to alter the chemical structure of the layer and may render it unsuitable for the purpose of Moriceau.

Applicant submits that for at least these reasons, the combination of Moriceau and Harberger does not appear to teach or suggest the combination of features of Applicant’s claims, including, but not limited to, the feature of “depositing at least one intermediate layer on a substrate, wherein the substrate is formed from monocrystalline silicon and wherein the intermediate layer is formed from doped silica comprising extrinsic atoms, wherein the extrinsic are atoms of phosphorus or phosphorus and boron, thus forming an intermediate layer of phospho-silicate glass (P.S.G.) or boro-phospho-silicate glass (B.P.S.G.).”

Claim 7

Applicant’s claim 7 states:

depositing at least one dielectric intermediate layer on a substrate formed from silicon, the dielectric intermediate layer comprising at least one base material wherein the base material is formed from silica and comprises extrinsic atoms, wherein the extrinsic atoms are atoms of phosphorus or phosphorus and boron, thus forming an intermediate layer of phospho-silicate glass (P.S.G.) or boro-phospho-silicate glass (B.P.S.G.);

For at least the reasons recited above, Applicant submits that the combination of Moriceau and Habberger at least fails to implicitly or explicitly teach the features of, “depositing at least one dielectric intermediate layer on a substrate formed from silicon, the dielectric intermediate layer comprising at least one base material wherein the base material is formed from silica and comprises extrinsic atoms, wherein the extrinsic atoms are atoms of phosphorus or phosphorus and boron, thus forming an intermediate layer of phospho-silicate glass (P.S.G.) or boro-phospho-silicate glass (B.P.S.G.),” in combination with the other features of Applicant’s claims.

D. The Claims Are Not Obvious Over Moriceau in view of Stierman Pursuant To 35 U.S.C. § 103(a)

The Examiner has rejected claim 13 as being unpatentable over Moriceau in view of U.S. Patent No. 4,979,015 to Stierman et al. (“Stierman”).

The Office Action does not appear to present the teachings of Stierman as a remedy to the deficiencies of Moriceau discussed above. Thus, for at least those reasons, Applicant submits that claim 13 is patentable over Moriceau alone, or in hypothetical combination with Stierman.

E. Summary

For at least the reasons cited above, Applicant submits that all claims are in condition for allowance. Favorable reconsideration is respectfully requested.

First Named Inventor: Michel Bruel
Appl. Ser. No.: 10/574,120
Atty. Dkt. No.: 5310-09500

Applicant respectfully requests a two-month extension of time to respond to the Office Action dated June 21, 2010. A fee authorization has been submitted for the extension of time fee. If any further extension of time is required, Applicant hereby requests the appropriate extension of time. If any fees are inadvertently omitted or if any additional fees are required or have been overpaid, please appropriately charge or credit those fees to Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C. Deposit Account Number 50-1505/5310-09500/EBM

Respectfully submitted,

/Eric B. Meyertons/

Eric B. Meyertons
Reg. No. 34,876

Attorney for Applicant

MEYERTONS, HOOD, KIVLIN, KOWERT & GOETZEL, P.C.
P.O. BOX 398
AUSTIN, TX 78767-0398
(512) 853-8800 (voice)
(512) 853-8801 (facsimile)

Date: November 19, 2010